



## **Pawnee replacement engine report.**

Reporter Keith Allen DDSC Committee Member 07/07/2005

The matter of the replacement engine for the Pawnee Aircraft has been discussed at length. The solutions have been investigated and attempts to ensure costings and benefit analysis meets with a consensus of committee members such that a decision on a resolution may be possible.

It has become clear in 2005 that investigations show that the cost benefit for a single Pawnee engine replacement are for **installation** at best cost neutral and at worse case cost **negative to the range of \$20,000 to \$50,000.**

It should be noted should the replacement engine be **successful** then a cost neutral engine replacement would benefit from a fuel cost benefit. This **benefit is estimated to be \$20,000** over the life of the engine. (2000hrs @ 35 l/hr Auto as opposed to 45l/hr Lycoming @ \$1 per litre)

Should the worse case build cost of +\$20,000 become evident then there would be **no fuel cost benefit.**

Should the worse case build cost of +\$50,000 become evident then there would be a project **loss of \$30,000.**

The real benefits the project aim for are lower fuel burn and quicker turnaround times.

Other benefits exist such as cheaper engine servicing for an Auto engine. But it should be noted that it has been estimated from accounts that engine service costs are only \$400 per 100 hourly the matter of \$8,000 a saving of as much as 50% is not considered over the life of the engine to be worth a risk.

Extra benefits such as cheaper engine refurbishment for an Auto engine can be considered. It is expected that a Lycoming will require a "freshen up" at 1000 hours with a not insignificant cost of \$10,000 this cost is same as a replacement Auto engine... the reliability of an Auto engine is an unknown. This has been put aside as an added benefit and not a decision benefit!

In a single engine (one off as opposed to several parallel or subsequent) replacement there would appear to be little benefit that may be gained and if all risks are realised then a large loss is envisaged.

The risks beyond the build process exist but have not been considered in the above. These risks are beyond the scope and skills of the reporter, they refer to maintainability and suitability of one off engineering solutions and reliability.

It is possible that building of a successful prototype and realisation of a Supplementary Type Certificate that gains throughout the gliding community can be realised and that subsequent fitments of engine will reduce costs and that the lower fuel burn and quicker turnaround times can be had. **It is clear that this gain could be huge.**

The process of a single engine replacement is just **NOT** possible in the strictest sense. Fitment of an Auto engine in a certified aircraft has no defined route for the documentation and certification systems of CASA. There is however a way of applying for a Experimental R&D certificate that could then be cancelled and the “prototype” be retired for private use.

If an Experimental R&D certificate was applied for there would be a range of tests that would be documented up front as being required and these tests are advised as what would be considered by the CASA designate and if these tests and the flying regime and area etc do not conflict with the safety of the public there is no reason why the certificate would be granted. The up front documentation of these R&D tests could also come with a cost, a local CAR35 engineer has been asked to quote but has yet to supply a figure, it is envisage that it **could be as high as \$20,000**, this needs consideration as it is **NOT** in the build figures.

The tests and R&D would certainly be considerable and these are the costs that cannot be estimated at this time. The tests are unknown without a certain level of investigation that the reporter is unable to fathom. **The tests have been advised as being between \$100,000 and \$500,000**. These tests are to ensure that the new Auto Engine configuration meets all the required original type certificates, this could (but it is uncertain) engine duration tests, “g” load tests, cooling at extremes tests, torsional stressing of the engine and drive system, redundancy tests...

Should an Experimental R&D certificate be granted and then the R&D program be unfulfilled in a short period of time then it would be doubtful whether the aircraft could resume life as a private aircraft quickly or ever! This violation would not be viewed well and it would be prudent to note that if the R&D was started and then abandoned that the period should not be shorter than several months. In essence it is probable that the person who signs off the R&D cert also signs off the return to private usage and violating their position could have unforeseen consequences.

At best the option of DDSC building the Pawnee with a V8 has a risk analysis beyond the benefits that could be gained for a single engine. The loss of revenue and fall back of the second tug for a significant period of time is beyond the financial situation of the club and this consideration should not be dismissed.

The costs of the STC are beyond the financial situation for DDSC, whilst it is true the costs can be recouped by sale of a successful projects technology it should be noted that type of enterprise is beyond the scope of DDSC.

The project if it succeeds is one for the whole gliding community, if GFA was to fund the STA and the build then DDSC would still be without a second tug for the duration of the R&D and no doubt beyond that period for GFA promotions. Could DDSC accommodate that?

**In short **is** the project of a Pawnee with an Auto Engine in the club’s best interests.**

**Should the GFA once again consider an “AutoTug Project” then we at DDSC have the skills and background to ensure it is a success. As advised to many by the CASA designate... take a cheap Pawnee with no engine and build it cheap and then develop it, it will save lots of money. There is no doubt that it can be a success.**